

## **4.0 ENVIRONMENTAL CONSEQUENCES**

### **4.1 Introduction**

Environmental consequences is the scientific and analytic basis for the summary comparison of effects. This chapter presents in detail and by resource the following effects:

- Direct, indirect, and cumulative effects of all alternatives
- Relationship between local short-term uses of the environment and the maintenance and enhancement of long-term productivity
- Irreversible and irretrievable commitment of resources that would be involved if any of the alternatives were implemented
- Adverse effects that cannot be avoided

### **4.2 Climate and Earth Movements**

#### **4.2.1 Hurricanes and Tidal Surge**

##### **4.2.1.1 Effect of the Proposed Action**

The proposed BAF would be constructed to comply with all required hurricane construction codes. JSC has an emergency plan outlining hurricane procedures that would be adopted and applied to the BAF. If tidal surge or receding floodwaters were to reach the BAF, possible structural damage could occur.

##### **4.2.1.2 Effect of the No Action Alternative**

Hurricane and tidal surge damage would be minimal on the site as there would be no new structures to damage. Some damage to the land surface including deposition of foreign materials may result if these climatic events were to occur.

#### **4.2.2 Rainfall**

##### **4.2.2.1 Effect of the Proposed Action**

Heavy rain events could result in flooding around the BAF if topography would be altered as such. The BAF would be constructed to effectively drain any excess water in a manner not to cause additional flooding upstream or downstream of the proposed site along Clear Creek or to other JSC property.

##### **4.2.2.2 Effect of the No Action Alternative**

Heavy rains should not cause flooding problems upstream or downstream of the undeveloped site outside of existing conditions. Flow levels would not be changed from the current conditions unless modifications occurred elsewhere on JSC property.

### **4.3 Construction Impacts**

#### **4.3.1 Air Resources**

##### **4.3.1.1 Effect of the Proposed Action**

The construction of the proposed facility would produce some air emissions. An increase of 22,679.62 Kg (25 tons) per year for VOCs or NO<sub>x</sub>, resulting from the proposed project, could trigger general conformity analysis. Emissions from the BAF are not expected to reach this significance level; consequently, a general conformity analysis should not be required.

Heavy machinery and trucks emit carbon monoxide, particulate matter, nitrogen oxides, hydrocarbons, and sulfur oxides. Steps should be taken to minimize emissions and control any dust created during construction. Air quality effects from construction equipment and associated vehicular traffic would be localized and temporary. These actions should pose no substantial impact upon air quality standards.

The proposed facility would primarily utilize equipment already in operation at JSC. Additional equipment may be necessary and vehicle use would occur, but normal operation and use of the proposed facility indicate there would be no effect on ambient air quality.

##### **4.3.1.2 Effect of the No Action Alternative**

There would be no changes in air quality if the no action alternative were implemented. Construction equipment would not be necessary and general maintenance activities would continue.

#### **4.3.2 Sound Environment**

##### **4.3.2.1 Effect of the Proposed Action**

Operation of heavy machinery and increased vehicular traffic would temporarily increase noise levels during the construction of the proposed facility on-site and to surrounding buildings. The temporary noise increase would not be likely to pose a threat to occupants, but the potential for hearing loss in construction workers at the site would exist during most construction phases.

Best management practices (BMP) shall be incorporated to minimize the impact of construction related noise to surrounding areas. JSC would require all safety standards be followed including wearing personal protection equipment (PPE) at all times during the construction of the BAF.

#### 4.3.2.2 Effect of the No Action Alternative

The sound environment would remain unaltered if the no action alternative were implemented.

#### 4.3.3 Spills and Hazardous Materials

##### 4.3.3.1 Effect of the Proposed Action

Heavy construction equipment brought from outside JSC has resulted in spills of hydraulic fluid and other petrochemicals at other construction sites. JSC would take precautions at the BAF site to prevent potential spills by requiring construction equipment be adequately maintained and serviced.

Based on the preliminary data provided, the generation of hazardous materials is not anticipated as a result of construction. Normal operations of the proposed facility could generate hazardous materials such as biomedical waste resulting from the biomedical research, chlorinated wastewater from the aquatic rehabilitation and exercise physiology pool filtration system, and chemical storage associated with aquatic facility operation and maintenance. No effects from hazardous materials, when managed in compliance with environmental regulations, are anticipated. JSC's Storm Water Pollution Prevention Plan may need to be revised to incorporate any outside storage of hazardous chemicals associated with the operation and maintenance of the aquatic rehabilitation and exercise physiology pool.

The location of the proposed running track would cross a series of buried petroleum, natural gas, and mixed butylene pipelines. Continued access to these pipelines must be considered for maintenance and emergency situations.

##### 4.3.3.2 Effect of the No Action Alternative

Existing conditions should remain unchanged if the no action alternative were implemented.

#### 4.3.4 Transportation

##### 4.3.4.1 Effect of the Proposed Action

The BAF would be designed to allow vehicle circulation by reducing the mixing of truck and automobile traffic by the user. Separate parking areas would be created for the Astronaut population visiting the Astronaut training and rehabilitation area. Additional parking areas would be provided for the Flight Medical Clinics and Research Laboratory personnel. A truck entrance would be created off of Avenue B.

No transportation impacts are expected at JSC. Street parking along Fifth Street may be reduced as a result of the facility, but sufficient parking for the proposed facility would be created. Some traffic congestion may occur during construction, but steps should be taken to ensure safe roadway conditions and access to all facilities. Traffic volume through the JSC Space Center Boulevard entrance may increase, but the entrance already uses a traffic signal and alterations in traffic flow outside JSC are not anticipated. Long-term effects on transportation are not anticipated.

#### 4.3.4.2 Effect of the No Action Alternative

Alterations in the traffic flow patterns are not anticipated with the no action alternative. Any changes in traffic flow or volume would be a result of changes occurring elsewhere at JSC. Street parking would remain a viable option for employees working in surrounding buildings, but new parking lots would not be constructed.

### **4.4 Water Resources**

#### 4.4.1 Surface Water and Drainage

##### 4.4.1.1 Effect of the Proposed Action

The filling and reconstruction of the drainage structures may alter the storm water drainage and flow at the site. Alternate surface water drainage routes should be considered prior to construction, particularly in the area of the proposed running track. Runoff from the additional parking lots may increase the non-point source discharge into the system. Adequate drainage, flow attenuation structures, and a detention area may be items of consideration for reducing non-point source discharges and additional flow associated construction of the BAF. The proposed site is greater than 2.02 hectares (5 acres) and would require the preparation of a Notice of Intent for a Texas Pollution Discharge Elimination System permit.

Construction impacts may result in the alteration of the drainage swale, the diagonal swale and the ditches. There may be temporary erosion causing sedimentation and turbid waters within the drainage swale. Contractors shall create and implement a stormwater pollution prevention plan in accordance with JSC and regulatory guidelines before construction begins. These sedimentation and erosion control procedures shall be carried out for the duration of construction.

The topography of the proposed site would not be altered substantially. The area of the proposed running track would be filled and the drainage swales would be filled and re-routed. Some fill material may be placed under the proposed building and parking lot for

leveling and stability. Impacts to topography relating to occupancy and maintenance of the proposed facility are not expected.

#### 4.4.1.2 Effect of the No Action Alternative

Increases in surface drainage and non-point source discharges are not anticipated with the no action alternative. The site would remain undeveloped with general maintenance continuing in its current manner. The no action alternative should have no effect.

### 4.4.2 Floodplains

#### 4.4.2.1 Effect of the Proposed Action

The proposed project would not affect any Harris County Flood Control District (HCFCD) infrastructure; consequently, there would be no detention requirement. The design engineer would be responsible for incorporating a design mechanism that would adequately address the local hydraulic conditions due to increased runoff. NASA should provide information to the City of Houston (COH) from hydraulic studies and impact analysis to allow for determination of impacts; however, the COH does not evaluate the effects of development on the floodplain. Federal facilities not falling under the jurisdiction of the County or City must comply with requirements of Executive Order 11988, which cover development in Special Flood Hazard Areas. The only portion of the proposed facility that may fall in the 100-year floodplain is the proposed running track. Construction impacts shall be avoided or minimized and mitigated. Alteration of the surface elevation within the designated floodplain boundary is not anticipated and no measurable impacts to floodplain levels are anticipated.

#### 4.4.2.2 Effect of the No Action Alternative

The no action alternative should not alter the surface elevation of the designated floodplain.

### 4.4.3 Groundwater

#### 4.4.3.1 Effect of the Proposed Action

Groundwater contamination has been noted in the vicinity of 4<sup>th</sup> Street where typical groundwater flow is to the northeast. At this time, it is not known if groundwater at the proposed site, along 5<sup>th</sup> Street and Avenue B, is contaminated. The 3 monitoring wells on the site would have to be removed during construction of the facility and should be tested prior to removal. Sample results would determine whether construction and normal operations of the proposed facility would impact groundwater. There is a possibility that during the construction of the BAF, workers could come in contact with potentially contaminated groundwater. Potable water at the proposed site would be

supplied by the Clear Lake City Water Authority, which draws its supply from surface water (D. Plaisance 2000).

#### 4.4.3.2 Effect of the No Action Alternative

No anticipated effects on the groundwater would occur if current maintenance activities continue. The existing groundwater wells should still be monitored in order to determine background levels.

### **4.5 Biological Resources**

#### 4.5.1 Vegetation

##### 4.5.1.1 Effect of the Proposed Action

The proposed site is an undeveloped fallow field, dominated by grasses. It has been used as a fill deposit site for as many as 20 years; therefore, the native vegetative community was altered many years ago. Planted native and non-native trees along the perimeter of the property may be cleared. Because the existing herbaceous and woody vegetation would be removed during construction of the proposed facility, some short-term erosion may occur.

##### 4.5.1.2 Effect of the No Action Alternative

The present vegetative community would persist in its early successional stages because maintenance mowing would continue with the no action alternative. The planted trees along the perimeter would remain intact.

#### 4.5.2 Wildlife

##### 4.5.2.1 Effect of the Proposed Action

Proposed improvements to the site would not support habitat areas suitable for most wildlife; however, landscaped areas may provide small pockets of habitat for adaptive species. If the integrity of the canal and swale remain intact, habitat may still be suitable for some species. Substantial displacement of wildlife is not anticipated, although some habitat would be lost. Remaining fields at or near the site may be able to accommodate displaced wildlife.

##### 4.5.2.2 Effect of the No Action Alternative

Despite the absence of natural vegetation on the proposed site, the existing vegetation does offer some protective cover and food resources for wildlife. Maintenance mowing would periodically remove this vegetation, which may have a negative impact for some species, but a positive impact for others. The drainage swale and canal should continue to provide suitable habitat for some species, if vegetation removal is limited.

### 4.5.3 Wetlands

#### 4.5.3.1 Effect of the Proposed Action

Wetlands are present on the proposed site, but a jurisdictional determination by the USACE has not been conducted to date. Coordination with the USACE may be required and permitting may be necessary before construction begins. Nationwide Permit 39, effective June 7, 2000, may be applicable for filling the 0.038-hectare (0.095-acre) wetland. Consequences of the outcome of the delineation verification could be as follows:

- 1) The USACE determines the area is not a jurisdictional water and no further action with the USACE would be required. This would result in no net loss to waters of the United States.
- 2) The USACE confirms the delineation as described in Chapter 3. The acreage remains under the 1/10-acre requirement for notification under Nationwide Permit 39. The permittee would receive confirmation of the delineation verification and applicability to utilize Nationwide Permit 39, in writing from the USACE. The permittee must submit a report, within 30 days of completion of the work, to the District Engineer that contains the information outlined in the regulatory guidelines.
- 3) The USACE disagrees with the delineation and the wetland acreage exceeds the 0.04-hectare (1/10-acre) limit, but remains under 0.20 hectare (1/2 acre). The permittee must have the wetland boundaries re-surveyed and submit a Pre-construction Notification to the USACE in accordance with General Condition 13. Mitigation measures would likely be required. The USACE would have 45 days from receipt of a complete application to review and issue a Nationwide Permit verification or exercise discretionary authority. This information would be required from the USACE, in writing, before construction would begin.

Due to the recent Supreme Court ruling concerning isolated wetlands (*Solid Waste Agency of Northern Cook County v. U.S. Army Corps of Engineers*, No. 99-1178, January 9, 2001), the wetland that would be impacted by the proposed project may not fall under the jurisdiction of the USACE under Section 404 of the Clean Water Act. The wetland does not appear to be hydrologically connected to any water of the U.S. and does not appear to be located within the 100-year floodplain. Based on this information, it is unlikely that mitigation would be required.

Executive Order 11990 calls for the avoidance and minimization of wetland impacts wherever there is a practicable alternative. The alternatives analysis indicated that the action alternative would impact a small, low quality wetland. The loss of function and value appear to be minimal based on size and location. Given the above information, there appears to be no practicable alternative to impacting this wetland.

Drainage ditches constructed in uplands are not considered waters of the United States and, thus, no permit from the USACE is required for re-alignment of the ditches and drainage swales (33CFR333.4(a)(3) and CFR33 Part 330). Soils on the proposed site are not subject to Farmland Protection Policy Act.

#### 4.5.3.2 Effect of the No Action Alternative

Mowing activities would temporarily trim down vegetation in the wetland, but the integrity of the wetland would remain despite the periodic vegetative disturbance.

### **4.6 Socioeconomic and Cultural Resources**

#### 4.6.1 Demographics and Economic Activity

##### 4.6.1.1 Effect of the Proposed Action

The BAF would employ civil service and contract personnel. The major contractor at the BAF would be Wiley Labs. Employment opportunities are expected within the NSBRI and flight projects management. Current employees hold most positions that would be associated with the BAF. Persons are currently located off-site or in other buildings throughout JSC, but consolidation would occur upon completion of the proposed facility. In addition, potential learning opportunities may be available for university personnel, foreign astronauts, and graduate students. Some temporary jobs may be created during the construction.

Executive Order 12898, dated February 11, 1994, requires the preparation of an environmental justice strategy that follows the framework of the National Environmental Policy Act (NEPA) and Title VI of the Civil Rights Act. The Executive Order prohibits disproportionately adverse human health or environmental impacts within minority and low-income populations.

Studies conducted for this project indicate that there will not be any disproportionate impacts to low-income or minority populations. No displacements will be required, and no impact to community cohesion is anticipated now or in the future, since the project area is largely undeveloped land and confined to JSC property. Because no residential households will be displaced, and no minority populations or low income populations



will be divided or isolated by the proposed project, no environmental justice issues have been identified for the proposed project.

#### 4.6.1.2 Effect of the No Action Alternative

The implementation of the no action alternative would have a negative effect on employment. Although new opportunities are expected only within the NSBRI and flight projects management and through temporary construction work, if the BAF were not constructed, jobs would not be created and potential learning opportunities would cease to exist.

#### 4.6.2 Cultural Resources

##### 4.6.2.1 Effect of the Proposed Action

Impact to cultural or archaeological resources is not anticipated at the proposed site. In the event that archeological deposits or features are encountered during construction, the construction operations shall cease within the immediate area and the Archeological Division of the THC and NASA shall be immediately contacted for further consultation. Work would cease in the vicinity until the requirements of Section 106 of the National Historic Preservation Act were met.

##### 4.6.2.1 Effect of the No Action Alternative

The no action alternative would not result in land alterations; consequently, any unknown archeological deposits or features would not be disturbed. There are no records of cultural resources for this site.

#### **4.7 Cumulative Effects**

The proposed action is not anticipated to have any measurable affect on local resources and facilities. Little, if any, new demand is expected for land resources, recreational space, or other resources in any other areas surrounding the proposed facility. Implementation of this action would provide the necessary facilities for supporting the International Space Station initiatives and help in meeting NASA's long range manned space flight goals without any reasonably foreseeable physical, biological, social, or economic effects on the quality of the human environment.

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